Bankable Resilience

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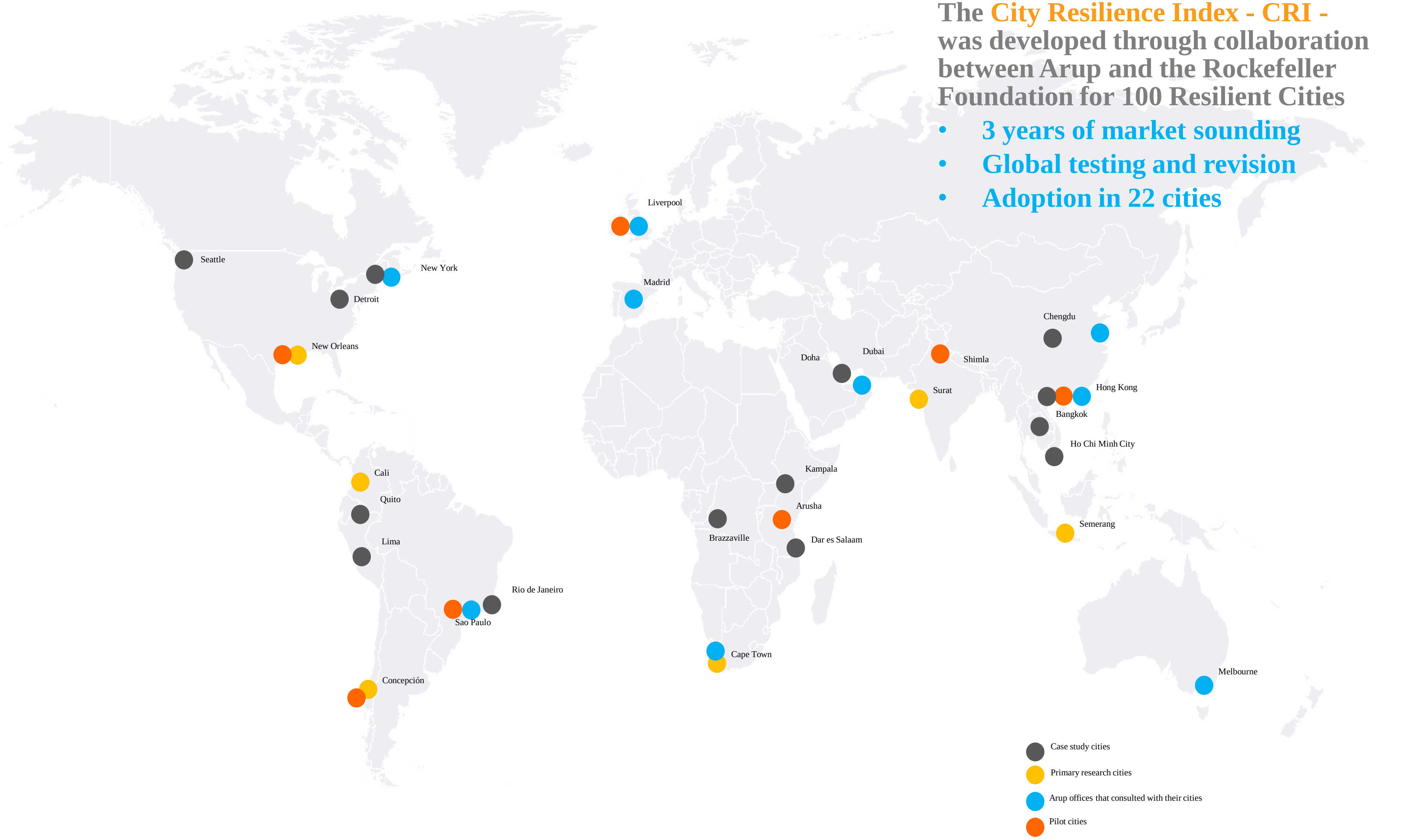
History of Arup Resilience Metrics

The City Resilience Index - CRI - was developed through collaboration between Arup and the Rockefeller Foundation for 100 Resilient Cities

- **3 years of market sounding**
- **Global testing and revision**
- **Adoption in 22 cities**



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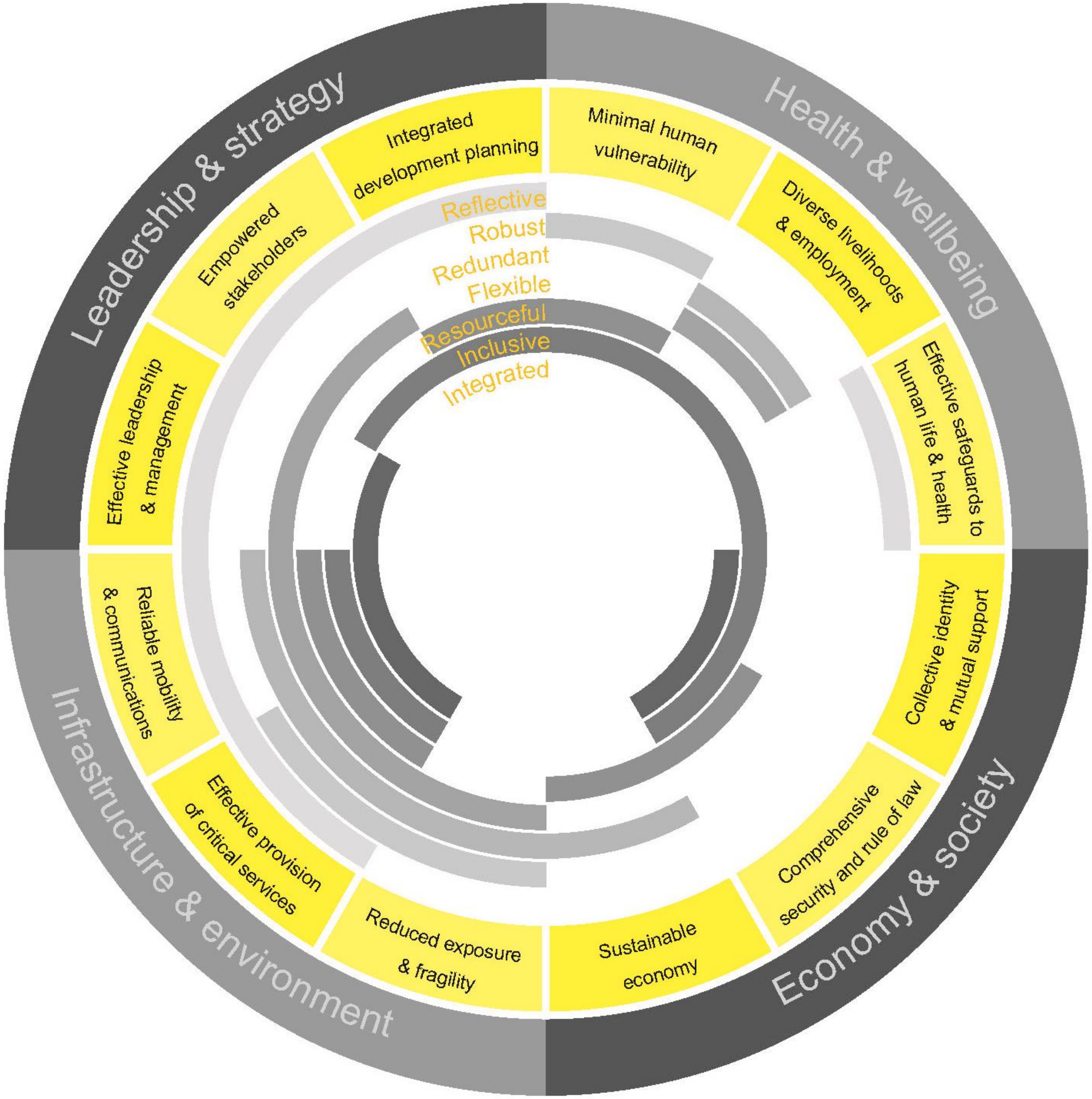
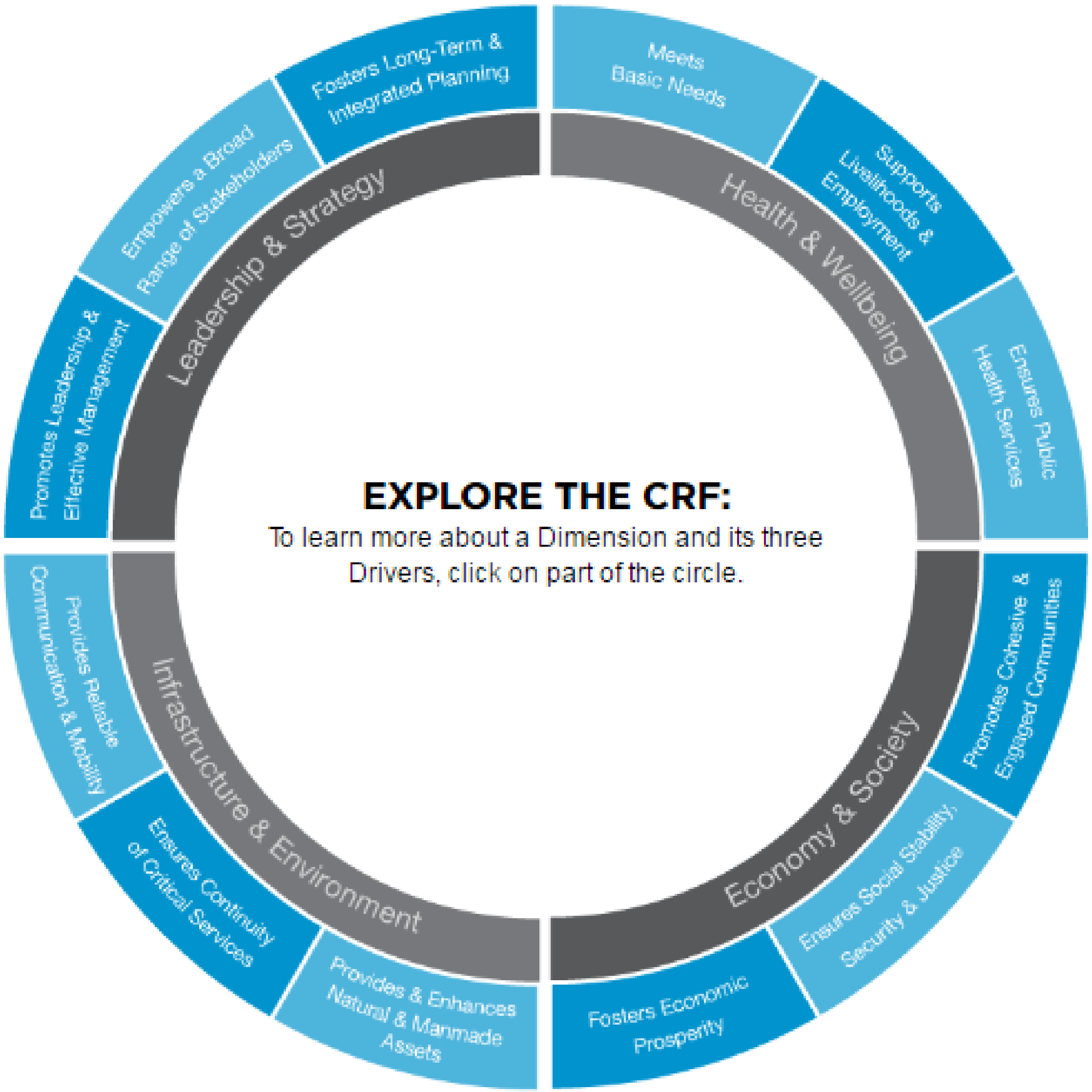
Qualitative Resilience Indicators of the CRI



1. Vulnerability
2. Employment
3. Health
4. Identity
5. Security
6. Economy
7. Exposure
8. Services
9. Mobility and Communication
10. Leadership
11. Stakeholders
12. Planning

100RC – City Resilience Framework



Resilience is the capacity of individuals, communities and systems to **survive**, **adapt**, and **grow** in the face of stress and shocks, and even transform when conditions require it.

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Reason current resilience methods fail to capture the return on investment

1. They focus heavily on physical damage and fail to weigh **losses from business interruption**/ loss of service

2. They focus only on post-disaster recovery efforts

3. They are developed at a macro-economic scale which does not translate well to smaller scales

4. Due to disagreement over metrics, they often undervalue returns on resilience investment by not accounting for the **costs of negative social and environmental impacts** that expenditures on resilience would have reduced

5. Metrics for capturing changes in property values, business tax base etc. have not yet been effectively utilized

6. The programs do not evaluate the investment market to understand the requirements of bankable projects

Traditional Funding Sources for Capital Investment

Public Funds	Private Funds
• Municipal budgets	• Donors and Grants
• Grants (Federal or State)	• **Project Savings**
• New General Taxes	• **Project Revenues**
• **Tax Districts**	• **Project Value Creation**

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Innovative Financing Sources

All based on quantifiable and measurable assets profile baselines prior to the project to be compared with "after the project" scenarios

Public Private Partnerships:

- Revenue Risks
- Availability Payment

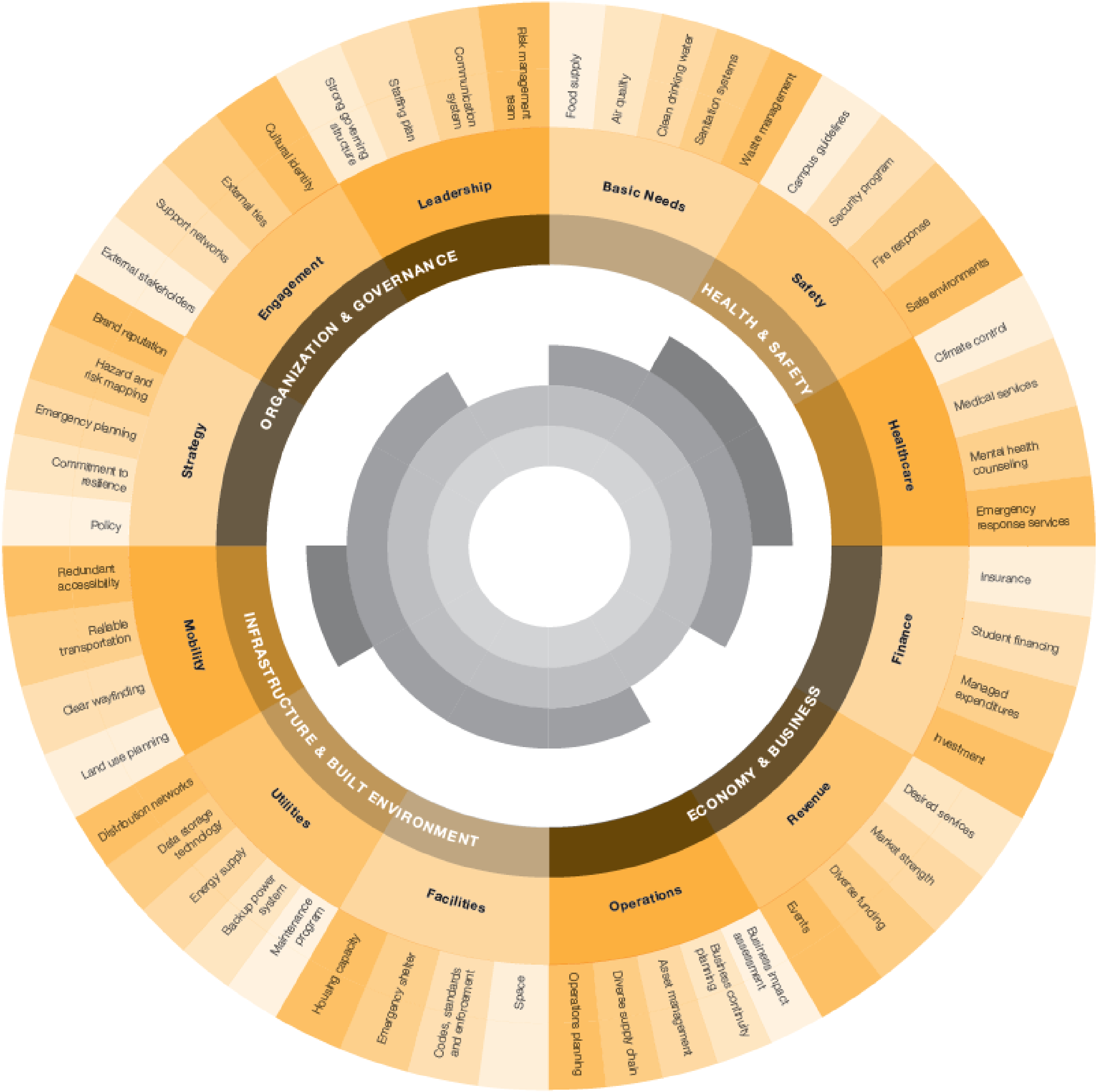
Land Value Capture:

- Community Benefit Districting
- Government Property Zoning Reallocation
- Joint Power Authorities

Loans and Bonds:

- General Obligation bonds
- Revenue bonds
- Resilience bonds
- Social Impact bonds
- Catastrophe bonds

Quantitative Resilience Metrics



A move to provide measurement of resilience potential to drive investment opportunities

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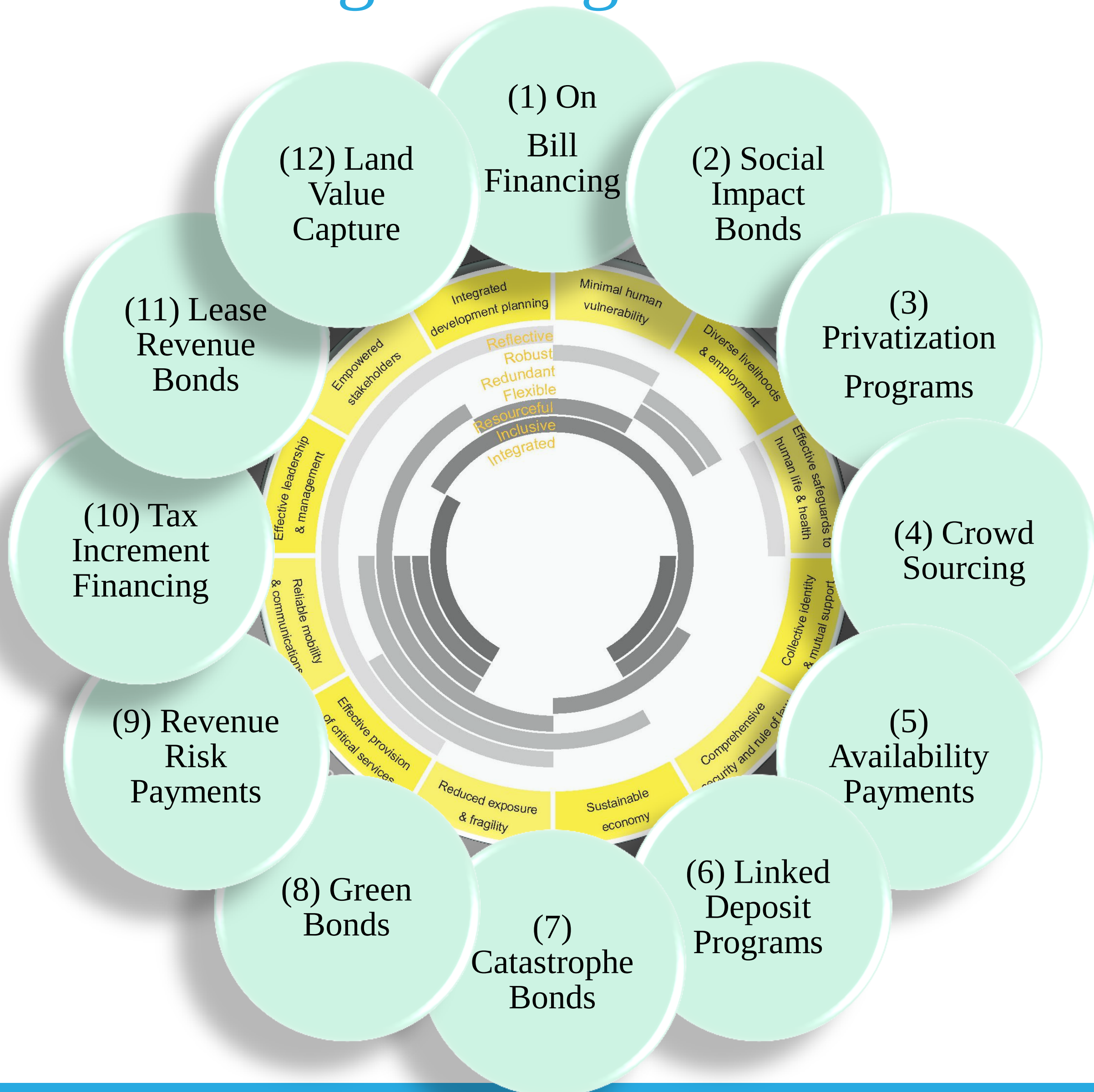
Resilience Financing Package



Links to Specific Sub-Indicators

Indicator	Sub-Indicator	Mechanism
1 Minimal human vulnerability	1.2 Adequate affordable **energy supply**	On Bill Financing to install micro-grids
2 Diverse livelihood and employment	2.3 Dynamic local **business development and innovation**	Social Impact Bonds to fund homeless welfare programs
3 Effective safeguards to human health and life	3.4 Effective **emergency response services**	Privatization of ambulance services
4 Collective identity & community support	4.1 Local **community support**	Crowd Sourcing to fund community awareness
5 Comprehensive security and rule of law	5.4 Accessible **criminal and civil justice**	Availability Payment PPP program to expand justice facilities
6 Sustainable economy	6.4 Attractive **business environment**	Linked Deposit Programs to make business systems more robust
7 Reduced exposure & fragility	7.4 Robust **protective infrastructure**	Catastrophe Bonds to fund Flood protection infrastructure
8 Effective provision of critical services	8.5 Adequate **continuity for critical assets and services**	Green Bonds to redevelop brownfield sites
9 Reliable mobility and communications	9.2 Effective **transport operation & maintenance**	Revenue Payments fund more resilient transport networks
10 Effective leadership and management	10.4 Comprehensive **hazard monitoring and risk assessment**	Tax Increment Financing to pay for Smart City programs
11 Empowered stakeholders	11.1 Adequate **education for all**	Lease Revenue Bonds increase community college capacity
12 Integrated development planning	12.3 Appropriate **land use and zoning**	Land Value Capture of low lying areas

1 – On Bill Financing

- **On-bill financing** refers to a loan made to a utility customer— such as a homeowner or a commercial building owner— the proceeds of which would pay for energy efficiency improvements. Regular monthly loan payments are collected by the utility on the utility bill until the loan is repaid.

2 - SIBs

Social Impact Bonds (SIBs) —also known as “social innovation financing” or “pay for success”—offer governments a risk-free way of pursuing creative social programs that may take years to yield results. Usually, governments decide what problems they want to address and then enter a contractual agreement with an intermediary (or bond-issuing organization) that is responsible for raising capital from independent investors including banks, foundations, and individuals, and for hiring and managing nonprofit service providers.

5 - PPP (Availability Payment)

- **Availability payment concessions,** where the concessionaire receives a periodic "availability" payment from the public partner based on the availability of a facility at the specified performance level;

6 - LDP

The **Linked Deposit Program (LDP)** helps existing New York State firms obtain reduced-rate financing so they can: undertake projects to improve their competitiveness; improve market access and product development; modernize equipment or expand their facility; introduce new technologies facilitate ownership transition and; promote job creation and retention.

7 - Cat Bonds

- **Catastrophe bonds** (**cat bonds**) are risk-linked securities that transfer a specified set of risks from a sponsor to investors. Catastrophe bonds emerged from a need by insurance companies to alleviate some of the risks they would face if a major catastrophe occurred, which would incur damages that they could not cover by the premiums, and returns from investments using the premiums, that they received. If no catastrophe occurred, the insurance company would pay a coupon to the investors. If a catastrophe did occur, then the principal would be forgiven and the insurance company would use this money to pay their claim-holders. The triggers are linked to major natural catastrophes. Catastrophe bonds are typically used by insurers as an alternative to traditional catastrophe reinsurance.

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8 – Green Bonds

- A **green bond** is a tax-exempt **bond** issued by federally qualified organizations or by municipalities for the development of brownfield sites. Brownfield sites are areas of land that are underutilized, have abandoned buildings or are underdeveloped, often containing low levels of industrial pollution.

9 - PPP (Revenue)

- A key motivation for governments considering **public–private partnerships PPPs** is the possibility of bringing in new sources of financing for funding public infrastructure and service needs. It is important to understand the main mechanisms for infrastructure projects, the principal investors in developing countries, sources of finance (limited recourse, debt, equity, etc.), the typical project finance structure, and key issues arising from developing project financed transactions.
- Toll concessions, in which the concessionaire receives compensation through obtaining the right to collect the tolls on a facility.

10 - TIF

Tax increment financing (TIF) is a public financing method that is used as a subsidy for redevelopment, infrastructure, and other community-improvement projects in many countries, including the United States. Similar or related value capture strategies are used around the world. Through the use of TIF, municipalities typically divert future property tax revenue increases from a defined area or district toward an economic development project or public improvement project in the community.

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11 - LRB

Community College League of California offers community college districts a cost-efficient method of financing equipment purchases and capital facilities projects through the issuance of **lease revenue bonds ("LRBs")** or through lease purchase financing.

LRB/lease purchase financing are two of the most successful methods developed in recent years to address immediate needs for capital acquisitions while improving the management of cash flow. By reducing interest rates, the tax-exempt feature of LRB/lease purchase financing has proven to be attractive to both borrowers and investors.

12 - LVC

Land value capture (LVC) is a method of funding infrastructure improvements that is successful upon recovering all or some of the increase in property value generated by public infrastructure investment. LVC can help mitigate the challenges cities face in obtaining public funding, while also providing benefits to private sector partners.